REMARKS

Claims 1-13 are pending in the application, of which Claims 1, 11 and 13 are independent claims. Claims 1, 7-9 and 11-13 are rejected under 35 U.S.C. § 102(e). Claims 2-6 and 10 are rejected under 35 U.S.C. § 103(a). Claims 1, 2, 3 5, 8, 11 and 13 have been amended to more distinctly claim the Applicants' claimed invention and to be consistent with the language used in the remainder of the claims. New Claim 14-52 have been added. The application is also subject to objections.

Disclosure Objections

As noted by the Examiner, the application numbers of co-pending applications were not specified on the application because those applications were filed on even date with the subject application. In response, the specification has been amended to specify those application numbers. No new matter is being added to the application.

Acceptance of the amendments and withdrawal of the objection is respectfully requested.

Claim Objections

Claim 12 is objected to based on informalities. As suggested by the Examiner, the Applicants have amended Claim 12 to depend from Claim 11.

Acceptance of the amendment and withdrawal of the objection is respectfully requested.

Rejections under 35 U.S.C. § 102(e)

Claims 1, 7-9 and 11-13 are rejected under 35 U.S.C. § 102(e) based on U.S. Patent No. 6,092,213 to Lennie. This rejection is traversed. The claims, however, have been amended to more distinctly claim the subject matter of the Applicants' invention. These amendments are not an acquiescence to the rejection. The Applicants respectfully submit that Lennie neither discloses nor suggests the claimed invention.

"A prima facie rejection based on anticipation requires that each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art

reference." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). That is, the prior art reference must disclose each and every element of the claim with sufficient clarity to prove its existence in the prior art. *In re Spada*, 911 F.2d 705, 708, 15 U.S.P.Q.2D (B.N.A.) 1655, 1657 (Fed. Cir. 1990) ("The [prior art] reference must describe the applicant's claimed invention sufficiently to have placed a person of ordinary skill in the field of the invention in possession of it." [emphasis added] (citations omitted)). Here, the Office has not set forth a prima facie showing of anticipation.

The Applicants claim a technique for maintaining a cluster definition for a network cluster. The network cluster has at least one member node that is coupled to a shared repository. A cluster definition for the network cluster is stored in the shared repository. A coordinator node is selected from the at least one member node. A member node requests a change to the cluster definition by sending a proposed change the shared repository. In response to the proposed change request, the coordinator node updates the cluster definition to reflect the requested change.

In contrast, Lennie discusses an approach for maintaining a cluster configuration and distributing the cluster configuration to nodes of the cluster. According to Lennie, a request to change the cluster configuration is received by a primary process running on one of the nodes. The primary process stores the configuration changes on a database registry and communicates the configuration changes to each node. When a node receives the configuration changes from the primary process, a monitor process running on the node stores the configuration changes in a database registry associated with the node.

To begin with, Lennie neither discloses nor suggests the Applicants' claimed invention. In particular, the Applicants' claimed shared repository requires:

- storing a cluster definition in the shared repository;
- a member node requesting a change to the cluster definition by sending a proposed change the shared repository; and
- updating, from the coordinator node, the cluster definition stored in the shared repository to reflect the requested change.

Although, Lennie discusses repositories that store cluster configuration data, none of the repositories discussed in Lennie include all the claimed limitations of the Applicants' claimed shared repository. That is, in Lennie: i) repositories are not shared, ii) a member node is not requesting a change by sending a proposed change to the shared repository, and iii) a coordinator node is not updating the cluster definition stored in the shared repository.

Instead of using a shared repository to store a cluster definition, Lennie discusses that each node has its own repository. In fact, there is no indication in Lennie that any of repositories are shared or used by more than one node. In Figure 2, Lennie depicts a flow diagram of the interrelationships between nodes, repositories (databases / registries) and processes. For illustrative purposes, Lennie's Figure 2 is shown below.

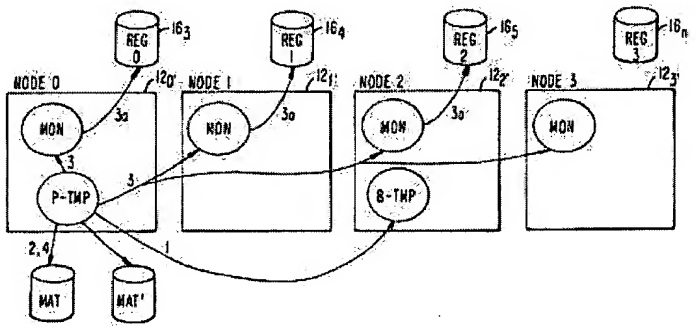

FIG. 2.

According to Lennie, the primary process (P-TMP) running on Node 0 ($12_{0'}$) is responsible for receiving cluster configuration changes and distributing the changes to each node (the arrows in Figure 2 illustrate this distribution flow). For example, the primary process (P-TMP) writes the changes both to a master audit log (MAT) in a repository associated with Node 0 ($12_{0'}$) and to a mirrored copy of the master audit log (MAT') in another repository associated with Node 0 ($12_{0'}$). Then, the primary process (P-TMP) distributes the changes to each node. Each node has a monitor process (MON) that receives the changes and writes the changes to the node's associated database registry. For instance, the monitor process running on Node 1 ($12_{1'}$) sends the changes to a registry (16_4) associated with the Node 1 ($12_{1'}$). Thus, each node has its

own repository and none of the nodes in Lennie are sharing or using the same repository. As such, Lennie does not discuss anything about a shared repository as claimed by the Applicants.

Not only does Lennie fail to suggest a shared repository, but Lennie teaches away from the claimed invention. By using local repositories, Lennie has no need for a shared repository. If Lennie were to employ a shared repository then there would be no need to copy data to each node, as discussed by Lennie.

In particular, Lennie teaches that a node should have its own "safe repository" to keep cluster configuration data safe from corruption. As such, Lennie does not suggest using a shared repository. A shared repository would be inconsistent with Lennie's approach to maintaining configuration data because by suggesting that it is safer for each node to have its own repository to store configuration data, Lennie discourages nodes from sharing repositories. Thus, Lennie's approach is contrary to the Applicants' claimed invention, which requires a shared repository to store a cluster definition.

Furthermore, Lennie neither discloses nor suggests the Applicants' claimed member node requesting a change to the cluster definition by sending a proposed change to the shared repository. In fact, Lennie's approach to maintaining and distributing cluster configuration data is not directed to requesting a change. Specifically, Lennie relates to a primary process that maintains and distributes cluster configuration changes after the changes have been received. In fact, Lennie provides very little insight regarding the details of configuration changes before they have been received by the primary process. One of the few details Lennie provides is that transaction monitoring is used to detect configuration changes. *See* Lennie, col. 4, ll. 48-59. Thus, Lennie does not discuss anything about a member node requesting a change to the cluster definition by sending a proposed change to the shared repository, and as a result, Lennie does not discuss the limitations and advantages of the claimed invention.

In particular, by requiring that each member node send its proposed change to a shared resource, the Applicants' invention can avoid a situation in which multiple nodes are trying to make changes to the cluster definition in parallel. Parallel edits can result in a cluster definition that partially represents changes made by a first node and partially represents changes made by a

second node. The resulting cluster definition is not representative of either node's proposed definition. *See* Specification, pg. 14, ll. 25 - pg. 15, ll. 2.

Lennie's approach to maintaining cluster configuration does not contemplate such problems associated with multiple member nodes proposing changes to a cluster definition. Indeed, Lennie does not suggest the Applicants' claimed member node requesting a change to the cluster definition by sending a proposed change to a shared repository. As such, Lennie neither discloses the requirements nor the advantages of the Applicants' claimed invention.

Thus, the Applicants' claimed invention requires certain limitations that are neither disclosed nor suggested by Lennie. In short, Lennie does not discuss the Applicants' claimed:

- **coupling** the at least one **member node** to a **shared** repository;
- **storing** a **cluster definition** for the network cluster in **the shared** repository;
- a **member node** requesting a change to **the cluster definition** by **sending** a proposed change to **the shared repository**; and
- the coordinator node **updating** the **cluster definition stored in the shared repository** to reflect the requested change.

As such, the Office has not established a prima facie showing of anticipation.

Claims 7 and 9 depend from base Claim 1, and Claim 12 depends from base Claim 11 and have been rejected under 35 U.S.C. § 102(e). As the dependent claims incorporate all limitations from the corresponding base claim, allowance of the dependent claims follows from allowance of the base claim. Because the base claim are in condition for allowance, the dependent claims should also be allowed. Reconsideration of the rejections under 35 U.S.C. § 102(e) is respectfully requested.

Accordingly, for each claim rejection under 35 U.S.C. § 102(e), the Office has not established a prima facie showing of anticipation. As such, the Office has not met its burden in establishing a prima facie case under 35 U.S.C. § 102(e). Consequently, the rejections under of Claims 1, 11 and 13 under 35 U.S.C. §102(e) should be removed.

Rejections of Claims under 35 U.S.C. § 103(a)

Claims 2-6 and 10 depend from base Claim 1, and have been rejected under 35 U.S.C. § 103(a). Specifically, Claims 2, 3 and 10 are rejected under 35 U.S.C. § 103(a) based on U.S. Patent No. 6,092,213 to Lennie in view of U.S. Patent No. 6, 014,669 to Slaughter. Claim 4 is rejected under 35 U.S.C. § 103(a) based on Lennie in view of U.S. Patent No. 6,003,075 to Arendt. Claim 5 is rejected under 35 U.S.C. § 103(a) based on U.S. Patent No. 6,092,213 to Lennie in view of U.S. Patent No. 5,964,886 to Slaughter. Claim 6 is rejected under 35 U.S.C. § 103(a) based on Lennie and Slaughter in view of U.S. Patent No. 6,243,702 to Bramford.

As the dependent claims incorporate all limitations from the corresponding base claim, allowance of the dependent claims follows from allowance of the base claim. Because the base claim are in condition for allowance, the dependent claims should also be allowed.

Even if the independent claims are not allowed, the Applicants respectfully submit that the references taken alone or in combination neither disclose or suggest the Applicants' claimed invention. For brevity, the Applicants will only highlight certain areas where the Office has failed to make a prima facie showing of obviousness under 35 U.S.C. § 103(a).

Addressing Claim 2, the Office has not made a prima facie showing of obviousness under 35 U.S.C. § 103(a) because neither Lennie nor Slaughter, take separately or in combination, disclose the requirements of the claimed invention. Specifically, neither reference disclose or suggest the Applicants' claimed member node requesting a change to the cluster definition stored in a shared repository including, sending a proposed change to a scratch area of the shared repository and setting a valid bit associated with the scratch area. In fact, there is no discussion in either reference regarding the Applicants' claimed techniques for requesting a change to the cluster definition.

Like Lennie, Slaughter discusses an approach to implementing a change to a cluster configuration, but does not discuss a technique for requesting a change. Further, neither Lennie nor Slaughter discuss the Applicants' claimed setting a valid bit associated with a scratch area in the shared repository. In fact, neither Lennie nor Slaughter even suggest that a scratch area of a

shared repository exists. Thus, the references do not disclose the limitations of Applicants' Claim 2.

Addressing Claim 5, the Office has not made a prima facie showing of obviousness under 35 U.S.C. §103(a). To begin with, the Office did not provide any motivation to combine Lennie and Slaughter absent hindsight. "Knowledge of applicant's disclosure must be put aside in reaching.. [a]..determination [of obviousness]." *See* M.P.E.P. § 2142. "[T]he examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made. In view of all factual information the examiner must then make a determination whether the claimed invention 'as a whole' would have been obvious at that time to that person. . . . Impermissible hindsight must be avoided and the legal conclusion must be reached on the facts gleaned from the prior art." *In re Glaug*, 283 F.3d 1335, 1338, 62 U.S.P.Q.2d 1151, 1152 (Fed. Cir. 2002). Indeed, the Office has not relied on any facts gleaned on from the prior art to provide motivation to combine the references.

Moreover, the references do not provide a reasonable expectation of success. Specifically, the references do not enable one skilled in the art to achieve the Applicants' claimed invention. A prior art reference is not enabling when it provides "only general guidance as to the particular form of the claimed invention or how to achieve it." (Citations omitted; internal quotations omitted). *In re Roemer*, 258 F.3d 1303, 1310, 59 U.S.P.Q.2d (B.N.A.) 1527, 1533 (Fed. Cir. 2001) (requiring that the prior art disclosure suggest a reasonable probability of success). The combination of Lennie and Slaughter does not enable one to achieve the Applicants' claimed invention as set forth in Claim 5 because neither reference discusses anything about potential member nodes that are requesting membership in the cluster and accessing the cluster definition stored in the shared repository. In particular, neither reference discusses anything about accessing, by a potential member node, the cluster definition stored in the shared repository.

Furthermore, the references do not discuss the limitations and advantages of Claim 5. Claim 5 requires requesting, by a potential member node, membership in the network cluster, and accessing, by the potential member node, the cluster definition. As such, the Applicants' claimed

technique advantageously allows a potential member node that does not have connectivity with the network cluster to receive the cluster definition by accessing the shared repository. *See* Specification, pg. 12, ll. 25-27.

Like other prior art systems, Lennie and Slaughter discuss an approach to distributing cluster configuration data, in which a node needs connectivity with a cluster in order to receive the cluster configuration. According to Lennie, any change to the cluster configuration is received by a primary process running on one of the nodes, which in turn, stores these changes on a database registry and communicates these changes to the other nodes. As a result, the nodes must have connectivity with the cluster in order to receive the configuration changes from the primary process.

Likewise, Slaughter discusses an approach in which network connectivity is required for a node to receive a cluster configuration. In particular, Slaughter teaches to implement a virtual disk operating on the nodes of a cluster, in which a distributed program monitors membership changes and conveys the membership changes to other programs running on the nodes in the cluster. Rather than discussing the Applicants' claimed shared repository, Slaughter discusses a shared virtual disk executing in the network cluster. The virtual disk in Slaughter uses several distributed programs to implement configuration changes across the cluster. As such, network connectivity is required for a node to receive a cluster configuration. Thus, Slaughter does not discuss anything about the Applicants' claimed accessing, by a potential member node, the cluster definition stored in the shared repository, and requesting, by the potential member node, membership in the cluster. As such, Slaughter neither discusses the requirements nor advantages of the Applicants' claimed invention.

Instead of requiring that a node have connectivity with the network cluster to receive a cluster configuration, the Applicants' claimed technique advantageously allows a node that does not have connectivity with the network cluster to receive an updated cluster definition when accessing the shared repository. *See* Specification, pg. 12, ll. 25-27. Thus, neither Lennie nor Slaughter use a shared repository in which a node can access the cluster definition. Rather than using a shared repository, both Lennie and Slaughter distribute a cluster definition to the nodes of

the cluster. As such, the references neither disclose the advantages nor requirements of the claimed invention.

In order to establish a prima facie showing of obviousness, three basic criteria must be met, as described in M.P.E.P. § 2142:

(1) There must be some suggestion, or motivation, to modify the reference or combine the reference teachings;

(2) There must be a reasonable expectation of success; and

(3) The prior art reference, or combined references, must teach or suggest all the claim limitations.

Thus, for each claim rejection under 35 U.S.C. § 103(a) the Office has not established a prima facie showing of obviousness. First, the Office has not shown that the references disclose the limitations of the claimed invention. Second, the Office has not shown that the references provide a reasonable expectation of success. Specifically, the references do not enable one skilled in the art to achieve the Applicants' claimed invention. A prior art reference is not enabling when it provides "only general guidance as to the particular form of the claimed invention or how to achieve it." (Citations omitted; internal quotations omitted). *In re Roemer*, 258 F.3d 1303, 1310, 59 U.S.P.Q.2d (B.N.A.) 1527, 1533 (Fed. Cir. 2001) (requiring that the prior art disclosure suggest a reasonable probability of success). Finally, the Office has not provided any suggestion or motivation to combine the references. Accordingly, the Office has not met its burden in establishing a prima facie showing of obviousness under 35 U.S.C. §103(a).

Reconsideration of the rejections under 35 U.S.C. § 103(a) is respectfully requested.

New Claims

New Claims 14-52 are being added to the application to more distinctly claim the Applicants' claimed invention. No new matter is being introduced. Acceptance and allowance are respectfully requested.

Information Disclosure Statement

An Information Disclosure Statement (IDS) is being filed concurrently herewith. Entry of the IDS is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned attorney at (978) 341-0036.

Respectfully submitted,

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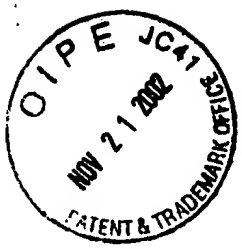
Dated: November 19, 2002



MARKED UP VERSION OF AMENDMENTS

Specification Amendments Under 37 C.F.R. § 1.121(b)(1)(iii)

Replace the paragraph at page 1, lines 8 through 18 with the below paragraph marked up by way of bracketing and underlining to show the changes relative to the previous version of the paragraph.

Serial No. [_____] 09/321,090, filed May 28, 1999, entitled A QUORUMLESS CLUSTER USING DISK-BASED MESSAGING, by Richard Frank, Michael Cusson, Joydip Kundu, and Daniel E. O'Shaughnessy, inventors;

Serial No. [_____] 09/321,998, filed May 28, 1999, entitled AVOIDING N-SQUARED HEARTBEAT MESSAGING PROBLEM IN AN OPERATING CLUSTER VIA CLOSED LOOP MESSAGING THEME, by Richard Frank, Michael Cusson, Joydip Kundu, and Daniel E. O'Shaughnessy, inventors; and

Serial No. [_____] 09/321,967, filed May 28, 1999, entitled PROVIDING FIGURE OF MERIT VOTE FROM APPLICATION EXECUTING ON A PARTITIONED CLUSTER, by Richard Frank, Michael Cusson, Joydip Kundu, and Daniel E. O'Shaughnessy, inventors.

Replace the paragraph at page 10, lines 21 through 26 with the below paragraph marked up by way of bracketing and underlining to show the changes relative to the previous version of the paragraph.

As described above in conjunction with FIG. 2, the cluster manager 32, in concert with the cluster managers residing on [nodes_ 2 - 4] nodes_2 - node_4 14, 16, 18, manages cluster connectivity within the quorumless cluster 10. For the cluster managers to effectively cooperate in the connectivity management endeavor, a facility for sharing data is provided. The shared storage device 22 of FIG. 1 houses a repository for this data sharing facility.

Replace the paragraph at page 24, lines 5 through 24 with the below paragraph marked up by way of bracketing and underlining to show the changes relative to the previous version of the paragraph.

A quorumless network cluster [is described which] provides a highly available system by addressing the partition-in-space and partition-in-time problems in network clusters.

[This solution provides a] In a particular solution, a cluster manager (CM) [which uses] can use disk based messaging to manage the operation of the cluster. Each node within the cluster must have access to a shared disk to operate within the cluster. [In the case of a partition-in-space problem, where a subset of nodes maintains full network connectivity among the nodes within the set but has no connectivity between the sets, the CM queries an application, operating on the cluster, to provide input to the CM to select which subset of nodes will survive as the cluster.]

[Also described is a] A particular methodology [for operating] can operate the cluster in a closed loop between nodes 1 to N. [Each node sends a single heartbeat message to the node ahead of it in the loop and receives a single heartbeat message from the node behind it in the loop.] If a node fails to receive a heartbeat message from its predecessor in the loop, it initiates a cluster reconfiguration by sending a reconfiguration message to each other node in the cluster.

The quorumless cluster [also provides] can also include a common storage for a cluster definition. [A single node is designated as the coordinator node of the cluster.] Each node may provide a proposed change to the cluster definition, however only [the] a single coordinator node may update the cluster definition and apply the suggested changes.

Claim Amendments Under 37 C.F.R. § 1.121(c)(1)(ii)

1. (Amended) A method for maintaining a cluster definition for a network cluster having at least one member node, the method comprising:

coupling the at least one member node to a [shareable] shared repository;

storing a cluster definition for the network cluster in the [shareable] shared repository;

selecting a coordinator node from the at least one member node of the network cluster;

at a member node, requesting a change to the cluster definition by sending a proposed change to the shared repository; and

in response to the proposed change request, updating, from the coordinator node, [updating] the cluster definition stored in the shared repository to reflect the requested change.

2. (Amended) The method of Claim 1 wherein requesting a change to the cluster definition includes:

sending [a] the proposed change to a scratch area of the shared repository; and

setting a valid bit associated with the scratch area of the shared repository.

3. (Amended) The method of Claim 2 wherein updating the cluster definition includes:

verifying the valid bit;

setting an update flag;

modifying the cluster definition to reflect the requested change;

logging a progress of modifying the cluster definition in a log file in parallel with modifying the cluster definition;

incrementing a version number associated with the [shareable] shared repository; and

clearing the valid bit and the update flag.

5. (Amended) The method of Claim 1 further comprising:

requesting, by a potential member node, membership in the network cluster; and

accessing, by the potential member node, the cluster definition stored in the shared repository.

8. (Amended) The method of Claim 7 wherein recovering includes:

selecting a new coordinator node from the member nodes of the network cluster[,]; and

completing, by the new coordinator node, an update of the cluster definition to reflect the requested change if there is a set valid bit and an incomplete log file in the [shareable] shared repository.

11. (Amended) An apparatus for updating a cluster definition for a network cluster having at least one member node, comprising:

a [shareable] shared repository coupled to the at least one member node of the cluster, the repository including the cluster definition and a proposed change to the cluster definition; and

a coordinator node, selected from the at least one member node of the network cluster, to update the cluster definition with the proposed change.

12. (Amended) The apparatus of Claim [12] 11 further including:

a log file, indicating a progress of updating the cluster definition.

13. (Amended) A computer program product for maintaining a cluster definition for a network cluster having at least one member node, the computer program product comprising:

a computer usable medium having computer readable program code thereon, including program code [which] for:

[couples] coupling the at least one member node to a [shareable] shared repository;

[stores] storing a cluster definition for the network cluster in the [shareable] shared repository;

[selects] selecting a coordinator node from the at least one member node of the network cluster; and

[directs] directing the coordinator node to update the cluster definition in response to a request to change the cluster definition [to reflect a requested change].